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12. OBSERVATIONS OF MATE CHANGE AND OTHER ASPECTS OF PAIR-BOND IN THE SARUS CRANE *GRUS ANTIGONE*

Sarus Cranes *Grus antigone* are known to be monogamous and pair bond is thought to last throughout the lives of the birds (Ali and Ripley 1989). The male and female of a pair are known to strengthen the pair bond by synchronized behaviours such as duet calls, dance, guard-calls and alarm-calls (Masatomi 1994; Archibald 1976). The actual duration of pair bond, prevalence of mate change and factors leading to such changes are unknown in Sarus Cranes. In this note, I report the first evidence of divorce or separation in Sarus Cranes with observations on other aspects of pair bond and territoriality.

Over two hundred and fifty breeding, territorial pairs of Sarus Cranes were monitored between December 1999-July 2002 as part of a study on their biology and conservation in the districts of Etawah and Mainpuri in Uttar Pradesh. The study area has the highest known density of territorial pairs and number of Sarus Cranes anywhere in the world. Pairs/families were recognized by colour-banding the juveniles each year, with individual physical marks on adult birds, or by location. Pairs, particularly those with young, were observed one to seven times a week (average of four observations) to collect data on breeding success, feeding habits, territory size, and activity budgets. Mate change was observed in two instances and is discussed in this note. "Divorce" or change of pair membership was actually observed in one pair, while mate change could be deduced in another. In addition, other relevant aspects of pair bonding, territoriality, and related behaviours observed are described and discussed. The behaviour terminology used throughout the text follows Ellis *et al.* (1998).

Mate change observation I

The territory of one pair was very close to the town of Etawah, and consisted of a large *Typha*-bordered marshland and crop fields. The pair had successfully raised one chick during the breeding season in 1999-2000, and was seen to defend the territory from other Sarus pairs and groups throughout the observation period. In early August, the adult birds were observed to chase the sub-adult from the territory,

and the frequency of duet calls (which is also used for advertisement during territorial defence, Archibald 1976) increased. In mid-August, the pair constructed a nest of *Typha* reeds in the marshland and the female laid two eggs, both of which were removed by villagers.

On September 8, 2000, during a routine visit to the area, another bird was seen in the territory and repeated attempts by the resident pair to chase the visitor (duet calls, tertial-elevation struts and co-ordinated guard calls) failed to elicit a response. In a surprising move, the visitor attacked the resident female (identified by smaller size and posture during duet calls). At first, the male assumed threat postures and carried out displacement preens, tertial-elevation struts, and a directed walk threat at the visitor. These attempts failed to displace the visitor, which instead renewed attacks on the resident female. The visitor was smaller than the resident male, but larger than the resident female. The resident female and the visitor sparred for almost five minutes, pecking each other and indulging in rapid, violent bouts of jump-rakes. The resident female was clearly losing the battle; the larger size of the visitor could have proved to be an advantage. At this point, the resident male, which was otherwise circling the fighting pair of cranes, walked in and pecked the resident female. The resident female began running away from the visitor, giving alarm-calls, and the male responded by calling synchronously, but did not come to the rescue. The visitor became very aggressive and mounted a fresh attack on the resident female by kicking, jump-raking, wing-thrashing, sitting on the back of the bird and pecking the neck and head hard and rapidly, finally chasing the bird into a pond and forcing it to swim to the opposite bank. The male was now chasing the resident female as well, and clearly supporting the visitor, though he synchronously answered the alarm and guard-calls of the resident female.

On emerging from the lake, the resident female was pursued once again by the visitor. This time, the female deliberately, but cautiously, approached human observers standing on the side of the marshland and stood as close as 5 m. This dissuaded the visitor from attacking further and she

resorted instead to a watchful preening session from beside the male bird. The resident female, while drying her wings, gave continuous calls, all of which were answered by the male. Several times, the resident female made a move towards the male, which caused the visitor to stop preening and walk towards her. Each time, the resident female would walk back towards the humans, causing the visitor to back off. After nearly an hour, the resident male and the visitor managed to chase the resident female away. The whole incident took place over a period of 55 minutes (1655-1750 hrs).

The male, with the visitor, commenced construction of a nest an hour later. The nest site was shifted the next morning due to human disturbance, and both birds worked vigorously at the construction. No eggs were laid and the nest was found abandoned a week later. The new pair was not observed duetting until the end of October, when they were also observed contact calling in synchrony for the first time, and were first observed dancing only in August 2001. Though the nesting season for Sarus Cranes in the study area is July-October (pers. obs.), the pair constructed a nest in April 2001, but no eggs were laid. The pair constructed a nest again in September 2001, but disturbance by people and cattle dissuaded them from laying eggs.

The reason for re-pairing by the male was not entirely apparent, though the larger size and more aggressive nature of the visitor female may have caused the male to choose over the previous, smaller one. The incident fits into the "forced divorce hypothesis" wherein a third dominant individual is responsible for break-up; previous reproductive success cannot predict the divorce and the break-up does not necessarily improve reproductive fitness of the divorced members (Choudhury 1995). This is also the only recorded instance of "courtship-role reversal" in Sarus Cranes with females being sexually competitive and displaying aggression to choose a male. Recent reviews have shown that this phenomenon arises when parental investment is greater by males (Gwynne 1991). This aspect of Sarus Crane biology has not been explored and promises to be an exciting subject for study. Young cranes are sometimes thought to build nest platforms immediately after establishing a breeding territory (Archibald 2000). The building of a nest in the above pair of cranes uncharacteristically in April 2000 may be part of the behaviour seen in newly paired young cranes.

Mate change observation 2

In another case, mate change could be deduced from a physical abnormality in the female bird – the mid-toe of the right leg of the female was missing. In 1999, the pair had successfully hatched two chicks, both of which were colour banded in December 1999 and observed to disperse from their

natal territory in June 2000. The pair was observed to nest in August 2000, but children removed both eggs and the pair did not re-nest. In November 2000, observations of the birds after the harvesting of paddy in the territory showed that the female was different, as evidenced by the presence of all toes on the feet. The male was presumed to be the same, since the territory being defended by the pair was exactly the same as that determined using colour-banded chicks the previous breeding season. The new pair nested in August 2001, villagers removed the eggs from the nest, and the pair re-nested 18 days later. The one egg from re-nesting hatched, but the chick disappeared within a week due to unknown circumstances. The pair did not re-nest following the death of the chick. The change of the female occurred between August and November 2000. In this pair, as in the previous case, mate change resulted in a decrease in immediate productivity and the male retained the territory. The pair was observed calling in unison in November 2000 and dancing a month later. The pair bonding after re-pairing, thus, was faster in this pair.

On mate change in cranes

Mate loss and divorce have been documented in Sandhill Cranes *Grus canadensis*. New pairs have been established in birds following separation or death of a partner (Nesbitt and Wenner 1987), and divorce has been observed in as many as 67% of 24 colour-banded pairs observed for 3-11 years (Nesbitt 1989). Though successful reproduction was seen to enhance the maintenance of a new pair bond, unsuccessful breeding was not necessarily always the cause for divorce (Nesbitt 1989). Also, as observed in the Sarus Cranes, territory was retained by males of separating pairs eight out of nine times (Nesbitt 1989). In another study on Florida Sandhill Cranes *G.c. tabida*, Nesbitt and Tacha (1997) recorded breaking of 44% of pair bonds; 32.3% of these were due to divorce. In this study, incidence of divorce was found to be related to failure to reproduce (Nesbitt and Tacha 1997). Territory was retained by males 92.9% of times, and females 69.2% of the time. In Eurasian Cranes *G. grus*, a hand-reared bird was recorded to change mates three times in seven years (Johnsgard 1983). Mate changing is known in almost all crane species in captivity, and data from captive birds suggests that mate changing is most common in the early years and stabilizes after birds find compatible partners (Swengel *et al.* 1996). In Sandhill Cranes, re-pairing of females that retained their territories was usually with younger males, while males re-paired with females of the same age as themselves, or older (Nesbitt 1989).

Mate changes in the Sarus in Etawah, however, occurred after cranes had bonded and even bred successfully. In the two breeding seasons after mate changing, the change of partner was observed to result in a decrease in productivity

of the pair in both cases. It is possible that productivity may be enhanced in the long run. Large-scale colour-banding of paired adults using individually colour-coded plastic bands and/or recording of duet-calls, which are known to be 'signatures' for a given pair (Wessling 2000), should be used to investigate mate changes in Sarus Cranes. Information on these aspects of behaviour of Sarus Cranes is entirely absent. These observations over two and a half years, of a very large number of breeding, territorial pairs, clearly indicate that not all Sarus pairs bond for life as is made out to be for the species.

On pair bonding and territoriality

A few other aspects of pair bonding and territoriality were observed during the study period. The first involves injury to the male just prior to the breeding season. In three pairs, the male was injured due to collision with electric wires, rendering one leg useless, preventing mating for the season. In one of these pairs, the nesting area, a perennial pond, was usurped by an adjoining pair, which did not have any natural wetlands in their territory. The nesting area was regained by the original owners after the leg of the injured male healed the following year. In the other two pairs, the adjoining pairs had sufficient area to nest in and did not perhaps need to usurp the territory of the pairs with the injured male. All three pairs had successfully weaned young the previous season, and observations of unison calls and absence of egg laying by females of all three pairs indicated that the female did not desert the males, and did not mate with other males.

In another instance, the male was alone for two years (gender recognized by posture during calls given while defending territory). Both years, the adjoining pairs could not appropriate any part of the territory. In February 2002, a female joined the male. In one other pair, the male's wing was injured badly, but the pair could successfully defend their territory from other pairs. The pair, however, did not breed in the three breeding seasons during which they were observed.

The second aspect involves death of the male: in only one pair the male was killed by electrocution after flying into live electric wires. The female, with her two fledged young, was ousted from the territory, most of which was appropriated by two pairs with territories adjacent to the territory of the female.

These observations suggest that it may not be possible for a female to defend territory alone. However, females with injured males seem to be able to successfully defend territories, as also single males. This is consistent with observations on Sandhill Cranes (Nesbitt 1989). The pattern also fits in with a male-dominated resource defence system (Greenwood 1980) where the male has a higher investment in securing and maintaining the resource (in this case, territory), and the female's mate choice is imposed upon the mating system of

the species. It is, however, not necessary that similar trends hold good in other areas with Sarus Cranes that have a low number of non-breeding individuals.

On aggression and cognition

Although pecking and jump-rakes have been observed to be part of the agonistic behavioural repertoire in every species of crane, the fights in Sarus Cranes usually do not escalate beyond jump-rakes (pers. obs.), and the risk of physical damage is minimised. The birds, instead, resort to lower levels of non-physical aggression that include a wide range of postures and calls (described in Ellis *et al.* 1998). Observations in Etawah show that Sarus Cranes are capable of terrific violence against conspecifics.

An interesting feature of the incident where divorce was observed was that of the resident female seeking protection from the attacking visitor by walking up very close to humans. That the bird did it repeatedly suggested an understanding on its part that the visitor would not risk close approach to humans. Though farmers often remove eggs from nests to dissuade pairs from breeding in their fields, they rarely persecute adult birds. The observation suggests higher cognitive abilities in Sarus Cranes than was previously known.

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13. DISTRIBUTION OF MASKED FINFOOT *HELIOPAIS PERSONATA* IN THE SUNDARBANS RESERVED FOREST OF BANGLADESH

Introduction

The Sundarbans Reserved Forest (SRF) of Bangladesh, the home of the Bengal Tiger, is a unique habitat for wildlife, especially for avian biodiversity. It is the world's largest contiguous block of mangrove forest, with an area of c. 6,017 sq. km, managed by the Forest Department since 1884 (Cannonizado and Hossain 1998). Of the total area, 4,143 sq. km is landmass, while 1,874 sq. km is water bodies. The Sundarbans mangrove forest is situated in south-western Bangladesh, between 21° 39' 00"-22° 30' 15" N and 89° 2' 00"-89° 54' 07" E. There are 32 species of mammals, 8 species of amphibians, 14 species of turtles, 30 species of snakes, 35 species of other reptiles, 186 species of birds (Hossain and Acharya 1994), 196 species of fishes (Bernacsek 2000) and 334 species of plants (Prain 1903) recorded. The Masked Finfoot *Heliopais personata* (G.R. Gray 1849 (1848)) is the only species of the Order Gruiformes found in the Sub-Himalayan region, in northeast India and in the Sundarbans of Bangladesh. This bird is also distributed in Myanmar, Malaysia and Thailand (Khan 2000). Grimmett *et al.* (1998) reported that the Masked Finfoot is a rare resident or visitor in Bangladesh. The Masked Finfoot found in Bangladesh Sundarbans is a resident. Not much literature is available on the biology of the Masked Finfoot in this region. Khan (2000) reported that it is endangered in Bangladesh and globally vulnerable.

The Masked Finfoot is a duck-like bird sparsely distributed over a large forest area of the Bangladesh Sundarbans. It is locally known as *Hans Pakhi*. Khan (2000) reported the Bangla name *Goilo Hansh*. This bird is usually found in tidal channels of dense swampy mangrove forest, which are relatively undisturbed. It was seen most of the time in

pairs, standing at the shores of the small rivers and channels. These channels and small rivers are locally known as *khals*. Sometimes the birds were found sitting on the trunk of baen trees (*Avicennia officinalis*) inclined over the *khals*. The head, neck and some part of the back is visible while swimming. The Masked Finfoot is very shy, solitary, and sometimes tries to hide in the grass if approached by people or boats. Khan (2000) reported its breeding from July-August and nests at a height of 1-3 m on horizontal branches of trees, built with twigs.

Distribution

A total of 24 Masked Finfoot were sighted in the SRF from 1999 to 2001. They were mostly seen in the freshwater zone that is in the eastern part of river Shippa of the Sundarbans mangroves. The maximum sighting was recorded while cruising in the Tambulbunia *khal*. Eight individuals were sighted in four different locations. This *khal* appeared to be relatively undisturbed. The maximum western limit of sighting of the Masked Finfoot is the Sarbatkhali *khal* of Khulna Range of the Sundarbans West Forest Division, which is also located in the freshwater zone, east of the river Shippa. This bird is normally seen in the Katka and Kachikhali *khal* of the Sundarbans East Sanctuary and near the western entry point of the Mara Bhola *khal*, which is located in the moderately saltwater zone. Besides these sites, the Masked Finfoot was seen in the Bara Morogmari *khal* and Jongra *khal* of the Sundarbans East Forest Division. None were ever sighted in the saltwater zone (Fig. 1), though the area was extensively searched and inquiries made. This bird was sighted over an area of 2000 sq. km. Each site was far from the others, so the